VOICE CONVERTING APPARATUS AND METHOD FOR CONVERTING USER VOICE THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. patent application Ser. No. 14/051,836, filed in the U.S. Patent and Trademark Office on Oct. 11, 2013, which claims priority from Korean Patent Application No. 10-2012-0113629, filed in the Korean Intellectual Property Office on Oct. 12, 2012, Korean Patent Application No. 10-2013-0111209, filed in the Korean Intellectual Property Office on Sep. 16, 2013, and U.S. Provisional Application No. 61/774,733, filed in the U.S. Patent and Trademark Office on Mar. 8, 2013, the disclosures of which are incorporated herein by reference in their entireties.

BACKGROUND

[0002] 1. Field

[0003] Methods and apparatuses consistent with exemplary embodiments relate to voice converting, and more particularly, to a voice converting apparatus which analyzes a voice of counterpart during phone call, coverts the voice of the counterpart into a normal voice, and outputs the voice, and a method for converting a user voice thereof.

[0004] 2. Description of the Related Art

[0005] Recently, due in part to an increase in air pollution, activities in restricted spaces, and use of mobile phones, some people suffer from a sore larynx and thereby experience change in their voices. Particularly, when a person's larynx is hurt due to any of a variety of reasons, a person's voice may change abnormally. Also, there are some people who naturally have what is spectrally considered to be an abnormal voice. Further, radio spectrum pollution, in the form of noise and loss of signal strength, may also distort a person's received voice such that appears abnormal.

[0006] Such an abnormal voice which may not be recognized properly may not only interfere with an attempt to have a smooth conversation with others, but may also cause discomfort and even misunderstandings.

[0007] For example, when an abnormal voice is heard during a phone call which may be performed through a communication terminal (for example, wired phone call, wireless phone call, etc.), a user may not recognize the voice properly and sometimes, it may not be possible to continue the conversation via phone.

[0008] Accordingly, a method and/or an apparatus that may help allow a user to have a smooth phone conversation with a counterpart who transmits an abnormal voice is desired.

SUMMARY

[0009] One or more exemplary embodiments relate to a voice converting apparatus which determines whether a voice is abnormal, and when it is determined that the voice is abnormal, converts the abnormal voice into a normal voice by adjusting a harmonic signal from the voice of the counterpart and provides the normal voice, and a method for converting a user voice thereof.

[0010] According to an aspect of an exemplary embodiment, there is provided a method of using a voice converting apparatus for voice conversion including receiving a voice from a counterpart, analyzing the voice and determining whether the voice abnormal, converting the voice into a normal voice by adjusting a harmonic signal of the voice in response to determining that the voice is abnormal, and transmitting the converted normal voice.

[0011] The determining may include extracting a voice parameter from the voice, and analyzing the extracted voice parameter and determining whether the voice is abnormal based on the voice parameter.

[0012] The voice parameter may include at least one of a pitch element of the voice, a Harmonic-to-Noise Ratio (HNR) of the voice, an open quotient of the voice, and a Grade, Roughness, Breathiness, Asthenia, Strain Scale (GRBAS) score of the voice.

[0013] The converting may include converting the voice into the normal voice by emphasizing a harmonic element of the voice and removing a sub-harmonic element of the voice.

[0014] The converting may include converting the voice into the normal voice by generating a harmonic signal in a high frequency band of the voice.

[0015] The converting the voice into the normal voice may be triggered on/off according to a user input.

[0016] The method may further include displaying a user interface configured to receive a user input for adjusting a conversion intensity of the voice into the normal voice, and setting the conversion intensity according to the user input received through the user interface. The converting may include converting the voice into the normal voice according to the set conversion intensity.

[0017] The method may further include storing information indicating that the voice is abnormal in response to determining that the voice is abnormal.

[0018] The converting may include converting the voice into the normal voice without determining whether the voice is abnormal in response to receiving information indicating that the voice is abnormal.

[0019] The method may further include outputting the voice immediately in response to determining that the voice is normal.

[0020] According to an aspect of another exemplary embodiment, there is provided a voice converting apparatus including a receiver configured to receive a voice from a counterpart, a voice determiner configured to analyze the voice and determine whether the voice is abnormal, a normal voice converter configured to convert the voice into a normal voice by adjusting a harmonic signal of the voice in response to determining that the voice is abnormal, and a transmitter configured to transmit the normal voice.

[0021] The voice determiner may include a parameter extractor configured to extract a voice parameter from the voice, and a parameter analyzer configured to analyze the extracted voice parameter and determine whether the voice is abnormal based on the voice parameter.

[0022] The voice parameter may include at least one of a pitch element of the voice, a Harmonic-to-Noise Ratio (HNR) of the voice, an open quotient of the voice, and a Grade, Roughness, Breathiness, Asthenia, Strain Scale (GRBAS) score of the voice.

[0023] The normal voice converter may convert the voice into the normal voice by emphasizing a harmonic element of the voice and removing a sub-harmonic element of the voice.